Milk recording in the Czech Republic and possible amendments of the ICAR Guidelines

Pavel Bucek, Czech Moravian Breeders´ Corporation, Inc.

WG Dairy Cattle Milk Recording
Aarhus, Denmark
Tuesday, 28 May 2013
Outline/agenda

• Basic overview about the situation in milk recording
• Methods used in milk recording
• Organisation and planning
• Sampling
• Lactation calculation
• Practical aspects of milk recording on the farm
• Plausibility, logical checks in software and selective measurements in QA in milk recording, supervision in milk recording
• Data transfer
• ICAR Guidelines and the possible survey of our working group
Herd size/customers’ structure in milk recording

Structure of the customers in 2011/2012

<table>
<thead>
<tr>
<th>Number of cows</th>
<th>Companies (n = 1,251)</th>
<th>Stables (n = 1,477)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Companies (%)</td>
<td>Number of stables in one company</td>
</tr>
<tr>
<td>1 - 100</td>
<td>26.9</td>
<td>1.0</td>
</tr>
<tr>
<td>101 - 200</td>
<td>18.8</td>
<td>1.1</td>
</tr>
<tr>
<td>201 - 300</td>
<td>15.6</td>
<td>1.2</td>
</tr>
<tr>
<td>301 - 400</td>
<td>11.5</td>
<td>1.2</td>
</tr>
<tr>
<td>401 - 500</td>
<td>10.1</td>
<td>1.4</td>
</tr>
<tr>
<td>Over 500</td>
<td>17.1</td>
<td>1.9</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>1.3</td>
</tr>
</tbody>
</table>

- One company has more than one stable
- 58.1% of cows are in a company with more than 400 cows
- 39.8% of stables have more than 400 cows
- 5% of cows are in small herds 1 – 100 cows (26.5% companies) and this has influence on the average herd size
Average herd size

- Average number of cows per company in milk recording in 2012 was 281 cows and per stable 238 cows
Method of milk recording in the Czech Republic

- **Method A**
- **A4**
- **AT (AT4) - only in the case of two milkings**

Czech recording guidelines also include B and C methods. These options are not used by the breeders. Control year starts on 1 October and finishes on 30 September of the next year.

### Standards for Recording Interval

<table>
<thead>
<tr>
<th>Recording Interval (Weeks)</th>
<th>Minimum Number of Recordings</th>
<th>Interval Between Recordings per Year (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Min.</td>
</tr>
<tr>
<td>4</td>
<td>11</td>
<td>22</td>
</tr>
</tbody>
</table>
New method of milk recording implemented in the Czech Republic

- We have implemented **a new method of milk recording**. The results of milk recording of animals for this method will be available in the next control year (2012/2013).
- **Milk production is measured for the whole control day** (all milking during the test day) and **sampling times alternate** in this new method which was implemented in the Czech Republic.
- Only method A is acceptable for the herd book and breeding value estimation
- **We do not accept method B for the herd book and for the breeding value estimation**
Expected trends in milk recording methods in the CR

Situation in 2011/2012

- A4 99.4%
- AT 0.6%

Expected situation in 2012/2013

- New method of milk recording in the Czech Republic (25%)
- Milk production is measured for the whole control day (all milking during the test day) and sampling is either p.m. or a.m.
- The new method of milk recording was implemented for the reason of increasing of flexibility in a big herd
- **We are not planning to accept method B for BVE and herd book in the near future**
- We are expecting a further increase in the new method of milk recording in the future in the Czech Republic
• The share of cows in milk recording since 2001 until 2012 was between 94.5 to 97.5%, which is one of the highest shares among the ICAR organisations.

• The total number of cows in the Czech Republic in 2012 was 369,749 and in milk recording 351,075.
Organisation of milk recording in the Czech Republic

**Czech Moravian Breeders´ Corporation, Inc.**
- Identification and registration
- Milk recording
- BVE and data processing
- Laboratory for milk and DNA analysis
- And other relevant fields in ICAR Guidelines

Supervision Czech Moravian Breeders´ Corporation, Inc.

Only sample taking is excluded from the Czech Moravian Breeders´ Corporation, Inc.

Supervision Czech Breeding Inspection (state organisation)

Authorised organisations are responsible for the sample taking
Planning of the milk recording on the farm

Key processes of planning

Monthly schedule in the local organisation units

Each third week during the month, there is a working meeting where the local manager plans the test days for another month. This respects the logistics of samples, requirements for analysis, organisational aspects, etc.

A record of this plan is entered into the internet application Inspector, which is kept in the Czech Moravian Breeders´ Corporation, Inc.
Sampling in milk recording in the CR (method A4)

• Sample must be representative
• For sample taking, pipets or measuring cups are used
• Volume of sample is 25 – 30 ml
• **Halved sample** (same amount of milk from the morning and evening milking), in the case of A4 when the interval between morning and evening milking is at interval of 10 – 14 hours
• **One-third sample** in the case of three milkings per day, the same amount of milk from each milking in case the interval between the two milkings is 8 plus minus 0.5 hours
• **One-fourth sample** in the case of four milkings per day, if the interval between the two milkings is 6 hours
• **In other possible cases** in milk recording in cattle, it is necessary to take a proportional sample which means from 1 litre of milk milked a sample of 1 millilitre of milk is taken
• Milk must be mixed and conserved with Bronopol
Sampling in milk recording in the CR (new method – production for all milkings and alternating sampling)

- Milk production per test day (all milkings) and sample p.m. a.m.
- Contents in milk are adjusted and counted according to the certified methodology
- **Interval of milkings 8 hours** – 3 milkings per day, the sample alternates (one month in the evening and the other month in the morning, etc.), a sample from noon is not taken
- **Interval of milkings 11 and 13 hours** - 2 milkings per day, sample is taken one month from the evening milking and the other month from the morning etc.)
- **Interval of milkings 10 and 14 hours** - 2 milkings per day, sample is taken one month from the evening milking and the other month from the morning, etc.)
- **Interval 12 hours** – alternating sampling without corrections and adjustment
Test interval method – lactation calculation

2.1.4. ICAR standard methods of lactation calculation
2.1.4.1. The Test Interval Method (TIM) (Sargent, 1968)

The Interpolation Method is the reference method for calculating lactations.

The following formulae are used to compute the lactation record for milk yield (MY), for fat yield (FY), and for fat percent (FP).

\[
MY = \frac{I_1(M_1 + I_2(M_1 + M_2) + I_3(M_1 + M_2 + M_3) + I_4(M_1 + M_2 + M_3 + M_4))}{2}
\]

\[
FY = \frac{I_1(F_1 + I_2(F_1 + F_2) + I_3(F_1 + F_2 + F_3) + I_4(F_1 + F_2 + F_3 + F_4))}{2}
\]

\[
FP = \frac{FY \times 100}{MY}
\]

Where:
M1, M2, Mn are the weights in kilograms, given to one decimal place, of the milk yielded in the 24 hours of the recording day.
F1, F2, Fn are the fat yields estimated by multiplying the milk yield and the fat percent (given to at least two decimal places) collected on the recording day.
I1, I2, In are the intervals, in days, between recording dates.
I0 is the interval, in days, between the lactation period start date and the first recording date.

Range of the values during the test day:
Milk 3.0 – 90.0 kg, fat 2.0 – 7.0%, protein 2.0 – 6.0%

High fat cattle breeds
### Calculation of contents during the test day
(method of milk production for all milkings, alternating sample)

<table>
<thead>
<tr>
<th>Time of milking</th>
<th>Interval in hours</th>
<th>Conversion</th>
<th>Number of milkings</th>
</tr>
</thead>
</table>
| **Evening (1)** | 8 hours, 3 milkings | Fat: \( y = 0.6971 x + 1.1044 \)  
Protein: \( y = 0.9219 x + 0.2291 \)  
Lactose: \( y = 0.8298 x + 0.8348 \)  
Somatic cell count: \( y = 0.8732 x + 43.246 \) | 3 |
|                 | Less than 11 hours | Fat: \( y = 0.7552 x + 0.5126 \)  
Protein: \( y = 0.9412 x + 0.1863 \)  
Lactose: \( y = 0.8911 x + 0.5258 \)  
Somatic cell count: \( y = 0.8592 x - 14.424 \) | 2 |
|                 | 11 and more hours | Fat: \( y = 0.7748 x + 0.5948 \)  
Protein: \( y = 0.9319 x + 0.2063 \)  
Lactose: \( y = 0.9446 x + 0.2684 \)  
Somatic cell count: \( y = 0.8264 x + 10.358 \) | 2 |
| **Morning (2)** | 8 hours, 3 milkings | Fat: \( y = 0.6871 x + 1.3191 \)  
Protein: \( y = 0.9353 x + 0.2582 \)  
Lactose: \( y = 0.9348 x + 0.3065 \)  
Somatic cell count: \( y = 1.0026 x + 19.591 \) | 3 |
|                 | More than 13 hours | Fat: \( y = 0.8016 x + 0.9680 \)  
Protein: \( y = 0.9648 x + 0.1290 \)  
Lactose: \( y = 0.9421 x + 0.2753 \)  
Somatic cell count: \( y = 0.9466 x + 67.530 \) | 2 |
|                 | 13 and less hours | Fat: \( y = 0.8754 x + 0.6841 \)  
Protein: \( y = 0.9619 x + 0.1415 \)  
Lactose: \( y = 0.9413 x + 0.2886 \)  
Somatic cell counts: \( y = 1.0319 x + 24.719 \) | 2 |
<p>| <strong>Evening (1)</strong> | 12 hours | Without correction | 2 |
| <strong>Morning (2)</strong> | 12 hours | Without correction | 2 |</p>
<table>
<thead>
<tr>
<th>Time of milking</th>
<th>Interval in hours</th>
<th>Conversion coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1st lactation</td>
</tr>
<tr>
<td>Evening (1)</td>
<td>10 and less hours</td>
<td>2.32</td>
</tr>
<tr>
<td></td>
<td>10.1 – 11.00 hours</td>
<td>2.23</td>
</tr>
<tr>
<td></td>
<td>11.01 and more hours</td>
<td>2.08</td>
</tr>
<tr>
<td>Morning (2)</td>
<td>14.01 and more hours</td>
<td>1.76</td>
</tr>
<tr>
<td></td>
<td>13.01 – 14.00 hours</td>
<td>1.81</td>
</tr>
<tr>
<td></td>
<td>13.00 and less hours</td>
<td>1.93</td>
</tr>
<tr>
<td>Evening (1)</td>
<td></td>
<td>1.00</td>
</tr>
<tr>
<td>Morning (2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Identification of samples, transport of samples to the laboratory and other relevant processes

- The technician of the authorised organisation assigns the numbers to the appropriate samples.
- Records are kept in the analysis certificate.
- The sample numbers are included in the analysis certificate.

- Samples have to be put in the transport box in ascending order.
- Keep the samples treated with a preservative agent in the coldest place possible (best at +5°C) and they must be protected from any misuse.
- The sample arrangement in the analysis certificate always has to correspond to the sample arrangement in transport boxes in ascending order.
Identification of samples, transport of sample to the laboratory and other relevant processes (position in stand)

- The sample is marked with its number (on the sample), which corresponds to the number in the analysis certificate and the document accompanying the transport box that contains the samples.

- The box with samples has a label with the identification data, on which there is the recorded number and name of the herd (stable).

- The box is accompanied with the analysis certificate, containing the stable number and stable name (documentation for the samples and the performance recording, the numbers corresponding to the position in the box containing the samples).

- The technician, who took the samples immediately, delivers them to the collection place. He or she puts them in the cooling box.

- The sample collection corresponds to the regulations in force with regard to time. No sample is valid without the number (non-identifiable).
Identification of samples, transport of sample to the laboratory and other relevant processes

- The technician delivers the boxes containing the samples to the collection place.
- Czech Moravian Breeders' Corporation, Inc. – utilising a refrigerated truck, ensures sample transportation to the laboratory from the collection places.

- The control of the accordance of the numbers shown in the sample book with the ones in the attached analysis certificate is carried out in the milk analysis laboratory.
- Within the sample receipt, the quantity of samples, which is stated by the analysis certificate, in relation to the actual quantity of samples, is checked.
- Also the control of the sequence correctness, according to the analysis certificate, is carried out, etc.
Perspective for the future – electronic identification of sample in the Czech Republic

Investment in the bar code reader and its software

Testing of PDA for the data capture and bar code from different companies

- **Data transfer: XSD, XML, WSDL**
- **ICAR project the Czech Republic, the Netherlands, France and Germany**
- Data transfer AMS to MRO, MRO to AMS
- AMS, we are planning to test this approach for electronic milk meters in milking parlours
Lactation

**Standard lactation** – 305 days, an acceptable interval is 204 – 304 days, minimum of milk production is 2,000 kg of milk. In case of lactation of more than 305 days, we use milk production for 305 days for lactation calculation.

**Disregarded lactation** – after 68 days from calving or two times interval of more than 37 days or one time of more than 75 days, in case of veterinary problems more than 100 days. Test day before the 6th day after calving is not accepted.

At least five test days for the acceptance of standard lactation (including analysis of milk contents).
How does the data arrive at the centre and by what route (Production records, somatic cells)?

- A sample collection in a milking shed or a cowshed, recording the drawn milk amounts, filling in the printed forms (milk recording technician)
- Sending the samples and printed forms to the milk analysis laboratory
- Analysis in the laboratory, creation of data sets containing the analysis results
- Sending to Plemdat (FTP data transmission) (every day)
- **Data processing obtained from the laboratory (every day; data check, storage into database)**
- Printing reports containing the milk analysis results and counts from the lactation start (daily)
- Sending reports to the selective breeding centres (daily or weekly)
- Sending data to the system Chovatelská data-Breeders' data (daily)
- Breeding values estimation with application of Test day model (3 times a year); (publishing the results-Internet, printed reports, data files)
- Sending BV to Interbull (3 times a year); (publishing the results-internet, data files)
Supervision programme

- The inspectors, who ensure the supervision of the performance recording, have their allocated areas in the Czech Republic where they carry out the controls.
- Within the Application Inspector, they obtain an overview, where in their area they perform the performance recording.
- In the field, they collect data on the control and submit data to the server.
- According to the date of control, recent controls at the end (a possibility of selection, where the control was not performed).
- Factor of the results from the control and supervision – discrepancies within the performance of the efficiency control.
- It is determined when he or she has to visit the breeding.
- The application determines the order.
Remedial measures

• Serious misconduct is handled by the superior officer with perhaps a repetition of the control
• Minor warning
• Low quality data are not utilised in the official results
• Super control
• Financial and other sanctions are imposed by the Breeding Inspection - external audit
Repeat Sampling (super control) - methodology

- Check of milk recording after the finished test day
- Repeat sampling made by the inspector of Czech Moravian Breeders’ Corporation, Inc.
- **Fat percentage outside interval**
- Herds which produce bulls for AI, cows with high milk yield, etc.
- Repeat sampling is ensured **no later than 48 hours after routine test day**
- There are two possibilities: repeat sampling of all animals from the test day or comparison of a group of selected animals
- **The key indicator is the fat percentage**: selection of herds, average value of fat was calculated from the weighted means of on-going lactations in milk recording in the Czech Republic, interval plus minus 2 standard deviations
- Differences are analysed separately in each particular animal
- Cancelling of results from the test day or repeating of test day
Plausibility checks (logical checks in software)

- **Other checks are in other parts of collecting data**
- Inspectors for performance recording
- Czech Breeding Inspection
- Super control – repeat sampling
- Managers of Czech Moravian Breeders' Corporation, Inc.
- **Checks in software**
  - Each event has its own numerical code and these codes are used for the changes in the database (new status of animal or specific action)
  - In some cases, a letter or non-numerical mark is used
- **Checks in software-conception frame**
  - Error-printing report
  - Errors marks * are not processed, in other cases alarm messages are printed
An example of plausibility checks (logical checks in software)

- 11 * Double report (same cow, same date of control day)
- 12 * Report form, non recorded stable
- 13 * Cow is not registered
- 14 * After 305 days after calving milk production increases more than 6 kilograms
- 15 * Milk and milk contents outside intervals
- 16 * Test day, or fat content reported after 365 days after calving, test day after finished lactation
- 17 * Test day is less than 6 days after calving
- 18 * Date of test day is less than process day
- 19 * Illogical date of test day, illogical time of milking, illogical interval between milking

- Reports deal with changes of calvings and movements
- 30 * Illogical sex of calve, unacceptable eartag
- 31 * Double report of change
- 32 * Movement to stable which is not on the list of stables in milk recording
- 33 * Cow is not registered
- 34 Chest girth, calving difficulties outside intervals Heifer pedigree is not available, Age at first calving is outside interval, pedigree is not accepted
- 35 * Mark of change does not exist
- 36 * Move down cow already exist
- 37 * Reported of change till closed lactation and unculled cow
- 38 * Illogical date of calving (outside interval)
- 39 * Calving interval outside interval
Plausibility checks (logical checks in software)

- **Overall milk yield – report of possible correction**
  - 80 * Wrong number of cows
  - 81 * Cow is not registered
  - 82 * Lactation is not registered
  - 83 * Lactation has not all information or this information is wrong
  - 86 * Wrong value – chest girth
  - 87 * Mistake in date of birth

- **One can also find some other reports and error checks in herd book processing, double calves, and reports for corrections in the whole live lactation of cow and errors in pedigree (only main points were mentioned)**

- **Other logical checks in software (plausibility checks reproduction, identification and registration, conformation, calving ease, herd book, quality assurance in laboratory........etc.**
Outputs and information for breeders

- **WWW pages – Easy data access available on line**
  - There is a service which is called “easy data access”
  - The breeders access results of milk analysis in real time
  - Farmers find it easier to handle and process the data more suitable for herd management
  - The data access is secured by password, supplied by the administrator after filling in the registration form
  - Farmer can make data available to other people
  - Quick overview about particular cows and their results
  - The advantage of this application is the possibility of further processing of data
  - The output data can be obtained in html, xls, txt, or csv formats
  - It also makes it possible to create an overview for particular herds
WWW pages – Easy data access to the results of milk recording

- It includes a different section:
  - Analysis for milk recording
  - Analysis for milk payment
  - Quick results of milk recording
  - Milk profit data used for management on the farm
  - Results of artificial insemination
Results of BVE

- Available online
- Different options and possibilities to sort animals according to the different criteria
Outputs for the farmers

- On line data access to the results of bulls and cows with all available results of performance and BVE
- Paper summaries
- Other possibilities (e.g. data files, etc.)
- One can also find other examples of services, reports and summaries for dairy cattle. Example listed above covers only selected services and reports
- The results are delivered to the farmers with a relatively extensive set of possibilities
Guidelines and survey

- Previous survey was well prepared
- Maybe it would be possible to add selected areas valuable for Guidelines and/or workshop and/or practical paper and recommendations from our working group valuable for the ICAR members
Guidelines and survey – new schemes of milk recording and precision marking of the milk recording method and sampling

- Marking of the different method and sampling
- Germany – very sophisticated description of method and sampling
- Czech Republic – milk yield from all milkings and sampling p.m. a.m.

- Survey – we could analyse the marking of less used methods and different approaches to sampling
- Guidelines – is there a need to have highly sophisticated marking system for sampling?
- In some specific cases (e.g. big herd) are these less used methods potentially valuable
Supervision, quality assurance and repeat sampling
Guidelines and survey

Harmonisation with ICAR CoQ, Guidelines for auditor

Repeat sampling – which approach is used?

Quality of milk recording

Logical checks in software (plausibility checks)

Supervision – which tools are used?

Some of the issues could be useful and valuable on how to improve ICAR Guidelines, for survey or practical oriented paper

Maybe it would be possible to add some short recommendations (points) to ICAR Guidelines in these fields
Processes in milk recording guidelines and/or survey

Not necessary to analyse all processes, possible approach is to select only valuable for Guidelines or practical workshop

Mapping of different processes in milk recording

Sample identification and transport

Organisation and planning

Practical working procedure

Tools for data capture and processes in milk recording

Practical working procedure

Lactation calculation method

To select key processes for the survey and then to use for Guidelines and/or practical workshop and/or paper with recommendations
Output from milk recording - survey

• Parameters and its statistical formulation
• Possible issue for our survey
• Partly relevant for amendments of ICAR Guidelines and maybe for paper and/or workshop about milk recording
• Advisory
• Supervisory and its connection with the Guidelines for ICAR CoQ
## Milk meters in the Czech milk recording scheme (2011)

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tru-Test Auto sampler</td>
<td>646</td>
</tr>
<tr>
<td>Tru-Test HI</td>
<td>2,192</td>
</tr>
<tr>
<td>Tru-Test WB</td>
<td>356</td>
</tr>
<tr>
<td>Afikim (Fullflow)</td>
<td>1,788</td>
</tr>
<tr>
<td>Afifflo 2000</td>
<td>1,561</td>
</tr>
<tr>
<td>Afifflo 9000</td>
<td>790</td>
</tr>
<tr>
<td>BouMatic Perfection 3000</td>
<td>865</td>
</tr>
<tr>
<td>Dairy Master Weighall</td>
<td>104</td>
</tr>
<tr>
<td>Favorit International</td>
<td>658</td>
</tr>
<tr>
<td>Flowmaster 2000/Alpro Flowmaster Pro</td>
<td>590</td>
</tr>
<tr>
<td>Metatron</td>
<td>2,186</td>
</tr>
<tr>
<td>MR 2000 (Combina 2000)</td>
<td>64</td>
</tr>
<tr>
<td>Pulsameter 2</td>
<td>20</td>
</tr>
<tr>
<td>Afilite</td>
<td>1,245</td>
</tr>
<tr>
<td>Insentec</td>
<td>666</td>
</tr>
</tbody>
</table>
Thank you for your attention!